GaAs SPDT Non-Reflective Switch
DC - 26.5 GHz

Features
- Broadband Performance
- Low Insertion Loss: 1.3 dB @ 20 GHz
- High Isolation: 46 dB @ 20 GHz
- Fast Switching Speed
- Non-Reflective Configuration
- Ultra Low DC Power Consumption
- Size: 1.3 × 0.85 × 0.1 mm
- RoHS* Compliant

Description
The MASW-011107-DIE is a versatile, broadband, non-reflective SPDT switch offered as bare die part. The switch operates from DC to 26.5 GHz and provides <2.0 dB insertion loss and >40 dB isolation. The combination of broadband performance along with very fast switching and excellent settling time make this device ideal for many applications, including Test & Measurement, EW and broadband communication systems.

The MASW-011107-DIE is fabricated using MACOM's mature 0.5 µm low gate-lag pHEMT process. This robust process features full surface passivation for a high performance and high reliability.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASW-011107-DIE</td>
<td>Die in Gel Pak¹</td>
</tr>
</tbody>
</table>

¹ Die quantity varies.

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Electrical Specifications: \( T_A = +25°C, V_1, V_2 = -5 V / 0 V, Z_0 = 50 \, \Omega \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test Conditions</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>0.05 GHz, 12 GHz, 18 GHz, 20 GHz, 25 GHz</td>
<td>dB</td>
<td>0.7</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>0.05 GHz, 12 GHz, 18 GHz, 20 GHz, 25 GHz</td>
<td>dB</td>
<td>1.0</td>
<td>1.1</td>
<td>2.0</td>
</tr>
<tr>
<td>Isolation</td>
<td>RFC RF1, RF2 “on state” RFC RF1, RF2 “off state”</td>
<td>dB</td>
<td>53</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>0.05 GHz, 12 GHz, 18 GHz, 20 GHz, 25 GHz</td>
<td>dB</td>
<td>44</td>
<td>43</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss</td>
<td>RFC RF1, RF2 “on state” RFC RF1, RF2 “off state”</td>
<td>dB</td>
<td>40</td>
<td>46</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>0.05 GHz, 12 GHz, 18 GHz, 20 GHz, 25 GHz</td>
<td>dB</td>
<td>41</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Input P1dB</td>
<td>0.5 - 25 GHz</td>
<td>dBm</td>
<td>15</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>0.5 - 25 GHz</td>
<td>dBm</td>
<td>17</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Input IP3</td>
<td>2 Tone, 5 dBm/Tone, 5 MHz spacing, 0.5 - 25 GHz</td>
<td>dBm</td>
<td>27</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>T_{RISE}, T_{FALL}</td>
<td>10% to 90% RF and 90% to 10% RF</td>
<td>ns</td>
<td>10</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>T_{ON}, T_{OFF}</td>
<td>50% control to 90% RF and 50% control to 10% RF</td>
<td>ns</td>
<td>20</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Control Current (Complementary Logic)</td>
<td>—</td>
<td>µA</td>
<td>1</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Absolute Maximum Ratings\(^{3,4}\)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Voltage</td>
<td>-8.5 V</td>
</tr>
<tr>
<td>Input Power</td>
<td>27 dBm</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65°C to +150°C</td>
</tr>
</tbody>
</table>

Truth Table\(^{5,6}\)

<table>
<thead>
<tr>
<th>Control Input</th>
<th>Condition of Switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>V1</td>
<td>V2</td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>

5. \( V_{low} = -5 \, V, V_{high} = 0 \, V \).
6. All V1 bondpads and V2 bondpads are connected on die respectively. Bias voltages can be supplied to any combination of V1 and V2 bondpads.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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Typical Performance Curves

**Insertion Loss**

\[
\begin{align*}
\text{S21 (dB)} & \quad \text{Frequency (GHz)} \\
-5 & \quad 0 \\
-4 & \quad 5 \\
-3 & \quad 10 \\
-2 & \quad 15 \\
-1 & \quad 20 \\
0 & \quad 25 \\
\end{align*}
\]

-25°C
-40°C
+85°C

**Isolation**

\[
\begin{align*}
\text{S21 (dB)} & \quad \text{Frequency (GHz)} \\
-70 & \quad 0 \\
-60 & \quad 5 \\
-50 & \quad 10 \\
-40 & \quad 15 \\
-30 & \quad 20 \\
-20 & \quad 25 \\
0 & \quad 0 \\
\end{align*}
\]

-25°C
-40°C
+85°C

**Return Loss, RFx On & RFx OFF**

\[
\begin{align*}
\text{Return Loss (dB)} & \quad \text{Frequency (GHz)} \\
-50 & \quad 0 \\
-40 & \quad 5 \\
-30 & \quad 10 \\
-20 & \quad 15 \\
-10 & \quad 20 \\
0 & \quad 25 \\
\end{align*}
\]

RFx On @ +25°C
RFx On @ -40°C
RFx On @ +85°C
RFx Off @ +25°C
RFx Off @ -40°C
RFx Off @ +85°C

**Return Loss, RF Common**

\[
\begin{align*}
\text{Return Loss (dB)} & \quad \text{Frequency (GHz)} \\
-50 & \quad 0 \\
-40 & \quad 5 \\
-30 & \quad 10 \\
-20 & \quad 15 \\
-10 & \quad 20 \\
0 & \quad 25 \\
\end{align*}
\]

RFx Common @ +25°C
RFx Common @ -40°C
RFx Common @ +85°C
Die Dimensions\(^7,8\)

All units are in µm, unless otherwise noted, with a tolerance of ±5 µm.

8. Die thickness is 100±10 µm.
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